ROLL-UP DOOR FOR VEHICLE SHELTERS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to collapsible vehicle shelters such as those having a structure made of assembled tubular members and cross-members and a complementary covering therefor made of a flexible plastic material and, more particularly, to a roll-up door for the door opening defined at the front of such vehicle shelters.

2. Description of the Prior Art

The present invention relates to roll-up closures for use in collapsible automobile shelters of the type illustrated in U.S. Pat. No. 4,887,627 issued on Dec. 19, 1989 to Audet. Audet discloses an improved collapsible shelter comprising a structure made up of tubular members and cross-members forming an assembly having side walls diverging from top to bottom and a roof section with the structure being covered by a covering complementary in shape to the assembled structure and made up of a weather proof flexible plastic material. At the front of the shelter, there is defined an opening which, in the Audet patent, is rectangular and is closed by curtain-type flexible plastic sheet doors provided on one or two sides of the opening. The opening is obviously intended for allowing the vehicle to access the shelter.

In other shelters, the front opening extends the whole width of the shelter, that is from side wall to side wall of the assembled structure, thereby having the shape of an isosceles trapezoid. Such openings are practical as they are as large as the shelter itself. However, it is difficult to adapt any closure to such a trapezoid-shaped opening and, to this date, roll-up curtain-type flexible closures have been used therefor with these closures being manually rolled-up from one side of the assembled structure laterally towards the other side thereof, whereat they are retained by strings.

Also known is a rectangular closure made of the same flexible material as the vehicle shelter itself which by way of cables and pulleys can be manually raised, in a way more or less similar to horizontal Venetian blinds, towards its retracted position. A number of spaced apart horizontally extending elongated rigid members are fixed to the closure so that the closure includes three sections which fold substantially like conventional garage doors. The sides of the closure are guided in a pair of parallel vertical rigid frame members.

U.S. Pat. No. 4,495,736 issued on Jan. 29, 1985 to Lamontagne discloses a vehicle shelter intended to house the front engine compartment of the automobile. This shelter includes a flexible canvas which surrounds the engine compartment substantially up to the windshield of the vehicle. Warm air is blown under the engine compartment so as to warm not only the crank-case but also the battery and other parts situated therein. The shelter is provided with a vertically rolled-up conventional and rudimentary closure 9. U.S. Pat. No. 4,150,682 issued on Apr. 24, 1979 to Ryce discloses a vehicle shelter comprising a closet-type enclosure with doors which contains a plurality of arched hoops having ground engaging skids and with a flexible covering being attached to these arched hoops. In storage, the hoops and the covering are retracted into the enclosure. The hoops may be pulled out manually from the enclosure and over a car parked in front thereof. The shelter itself does not actually include any flexible door for access thereto, when expanded.

U.S. Pat. No. 5,123,474 issued on Jun. 23, 1992 to Smith discloses a roll-up closure device made of a flexible material

which is rolled-up on a motor driven tubular cylindrical drum journalled at the ends thereof on bearings. The closure is guided in vertical tracks which define therebetween a rectangular opening with the closure being of rectangular complementary shape.

U.S. Pat. No. 5,042,556 issued on Aug. 27, 1991 to Ruiter discloses a door assembly for a rectangular doorway opening, such as a garage opening, which comprises a flexible door panel which is guided around rotatable guide wheels between a vertical closed position and a horizontal open position.

U.S. Pat. No. 3,878,879 issued on Apr. 22, 1975 to Manns discloses a roll-up door having a flexible door-leaf arranged to be wound about a roller for closing and opening the rectangular door with trolleys running in guide rails being located at the vertical side frames for maintaining the door-leaf in a laterally stretch condition, and with a movable pulley loaded by a weight being provided for maintaining the door-leaf in a vertically stretched position.

U.S. Pat. No. 5,163,495 issued on Nov. 17, 1992 to Lichy discloses a closure assembly for closing a rectangular opening which comprises a pair of vertical guides and a closure member engaged in the guides so that the closure member can slide along the guides. The closure member includes a pair of vertical tape-shaped tracking members disposed on opposite edges thereof and which are retained within the guides. A biasing assembly which enhances lateral tension on the closure member is also suggested.

U.S. Pat. No. 3,749,107 issued on Jul. 31, 1973 to Laberge discloses a collapsible shelter which comprises a plurality of upstanding parallel spaced apart arched members, the lower ends of which being received in a pair of channels fixed to the ground. A flexible covering is spread over the arched members with the lower edges of this covering being held by the channels.

U.S. Pat. No. 3,463,174 issued on Aug. 26, 1969 to Heller discloses a portable cover structure for a vehicle, wherein foldable frame sections have curtain tracks attached thereto, the frame sections being pivotally hinged so as to form, when expanded, a continuous covered level frame defining an uninterrupted curtain track which receives a curtain for completely enclosing the level frame.

U.S. Pat. No. 2,886,104 issued on May 12, 1959 to Swan discloses an awning of rectangular shape which can be displaced between an inoperative retracted position and an operative extended position wherein, when extended, the awning will provide a roof enclosure having its fabric maintained in a taut condition.

U.S. Pat. No. 3,460,602 issued on Aug. 12, 1969 to Hugus discloses a tensioning device for a rectangular flexible roll-up closure, wherein the flexible closure membrane is fastened to a bottom rail which is displaceable relative to an upper roller around which the membrane can be wound and unwound as the closure opens and closes. Tension is applied to the flexible closure membrane by way of a spring and cable system which biases the bottom rail away from the upper roller. The membrane is guided along a pair of vertical trackways.

SUMMARY OF THE INVENTION

It is therefore an aim of the present invention to provide an improved closure device for vehicle shelters.

It is also an aim of the present invention to provide an improved roll-up closure device adapted to close a shelter door opening having a tapered shape and, more particularly,

an isosceles trapezoidal shape, wherein the parallel sides of the trapezoid correspond to the horizontal sides of the door opening, with the door being wound in an horizontal position at the top of the door opening.

It is a further aim of the present invention to provide a roll-up closure device for vehicle shelters which is driven by a reversible motor which can also preferably be actuated from a remote location.

It is a still further aim of the present invention to provide a roll-up closure device for vehicle shelters wherein the flexible closure or door includes laterally inward biasing means for maintaining the flexible closure taut during the opening and closing thereof, and for allowing the flexible closure to somewhat yield depth-wise.

Therefore, in accordance with the present invention, there is provided a roll-up closure device typically for use on vehicle shelters of the type defining at a front end thereof a door opening having lateral sides which diverge from top to bottom, comprising a pair of guide means adapted to be mounted to the vehicle shelter substantially at the lateral sides of the door opening and substantially parallel thereto, an overhead roller means adapted to be rotatably mounted inside the vehicle shelter and substantially horizontally above the door opening, a flexible closure means adapted to be secured at a top end thereof to said roller means, at least a section of said flexible closure having a shape substantially complementary to that of the door opening and including diverging lateral side edges adapted to be engaged in said guide means, whereby a rotation of said roller means causes said flexible closure to displace along said guide means and to wind around said roller means or to unwind therefrom for displacing said flexible closure towards an open or a closed position thereof, respectively.

BRIEF DESCRIPTION OF THE DRAWINGS

Having thus generally described the nature of the invention, reference will now be made to the accompanying drawings, showing by way of illustration a preferred embodiment thereof, and in which:

FIG. 1 is a perspective view of a collapsible shelter for vehicles adapted with a roll-up closure device in accordance with the present invention, the closure device being shown in a closed position thereof;

FIG. 2 is a front elevational view of part of the closure device of FIG. 1 and, more particularly, of a flexible closure thereof and the cables running therethrough;

FIG. 3 is a partly broken way front elevational view of the left hand part of the shelter and the roll-up closure device of FIG. 1;

FIG. 4 is a cross-sectional side elevational view taken along line 4—4 of FIG. 3;

FIG. 5 is a cross-sectional view taken along line 5—5 of FIG. 3;

FIG.6 is a cross-sectional view taken along line 6—6 of FIG. 3;

FIG. 7 is a cross-sectional view taken along line 7—7 of FIG. 4;

FIG. 8 is a cross-sectional view taken along line 8—8 of FIG. 4;

FIG. 9 is a perspective view of part of the roll-up closure device of the present invention;

FIG. 10 is a longitudinal vertical cross-sectional view of part of the roll-up closure device;

FIG. 11 is a vertical cross-sectional side view of part of the roll-up closure device;

FIG. 12 is a perspective view of a detail of the variant of FIG. 11; and

FIG. 13 is a perspective view of the vehicle shelter and of the roll-up closure device of the present invention, similar to FIG. 1, but showing the roll-up closure device in a half open position and adapted with the variant of FIGS. 11 and 12.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 illustrates a conventional vehicle shelter S adapted with a closure device D in accordance with the present invention, wherein the vehicle shelter S comprises a supporting structure made up of a series of vertically and transversely oriented, spaced apart and parallel, arched members 10 which are connected one to the other by longitudinal cross-members 12 (see FIG. 13), with a covering C being installed around the structure and being attached to the various arched members 10 and cross-members 12. The covering C which is made of a flexible plastic sheet material comprises a roof section 14 wrapped around the arched members 10, and a vertical front section 16 located above the door opening defined in the shelter S for providing access for a vehicle to the inside of the shelter S. The closure device D of the present invention is intended to selectively open or close the door opening of the shelter S. As best seen in FIGS. 1 and 12, the shelter door opening has the shape of an isosceles trapezoid- The closure device D of the present invention is of the roll-up-type and includes a pair of support plate 18 adapted to be fixedly mounted to the structure of the shelter S and, as best seen in FIG. 3, to an upper cross-member 12 thereof by way of a bolt and wing nut assembly 20 of the type already provided in the conventional shelter S for securing the cross-members 12 to the arched members 10. A guide rail 22 is secured to each one of the support plates 18 and extends therefrom in a downwardly and slightly inclined way in such a way as to follow the sides of the trapezoidal door opening- The lower end of each guide rail 22 is secured to a respective lower one of the cross-members 12 again using the bolt and wing nut assembly 20. As seen in FIG. 4, brackets 24 are provided on the support plates 18 and on the guide rails 22 for use with the bolt and wing nut assemblies 20 to secure the closure device D to the shelter S.

Each support plate 18 is provided with a pulley system and a cable system which will be described in details hereinafter. Only one of the support plates 18 and, more particularly, the left one in the drawings is provided with a motor 26 coupled to a reducer gearbox 28 which drives by way of a toothed belt 30 a shaft 32 which extends transversely above the door opening and which is journalled at its ends to the support plates 18. Asides from the motor 26, the reducer gearbox 28 and the toothed belt 30, the equipment provided on each of the support plates 18 is identical.

A flexible closure 34 made of a plastic sheet material which is well illustrated in FIG. 2 is adapted to engage at the sides thereof the guide rails 22 for displacement therealong so that the closure 34 is either wound around the shaft 32 or is unwound therefrom depending on the rotation of the motor 26. As best seen in FIGS. 2 and 5, the closure 34 defines a loop at each side thereof with a cable 36 extending through this loop. As seen in FIG. 2, the closure 34 includes an upper straight section intended to extend above the door opening and to be attached to the shaft 32 and a lower flared

section adapted to follow the shape of the door opening so that, when the closure **34** is closed as in FIG. **1**, the closure **34** completely closes off the trapezoidal door opening defined at the front end of the shelter S- A Teflon™ block **38** is fixedly secured near the bottom end of each side of the closure **34** for reasons which will be explained in details hereinafter.

The side edges of the closure **34** and, more particularly, the loops thereof enclosing the cables **36** and the lower blocks **38** enclosing both the closure loops and the cables **36** are received into the guide rails **22** which each define an inwardly facing longitudinal slot **40** for allowing the closure **34** to extend through the guide rails **22**, inwardly from the cables **36**. As seen in FIG. **4**, there is rotatably mounted a lower pulley **42** at the bottom ends of each guide rail **22**.

As best seen in FIGS. **2**, **4** and **13**, each support plate **18** comprises a pulley system which includes a front guide pulley **44** and a double pulley **46** which comprises a slightly outwardly angled outer pulley **48** and a frusto-conical inner pulley **50**. The cable **36** is fixedly attached at both ends thereof to the double pulley **46** and, more particularly, one end of the cable **36** is attached to the outer pulley **48** with the other end thereof being attached to the inner pulley **50**. From the inner pulley **50**, the cable **36** passes around the guide pulley **44** and then runs along the lateral edge of the closure **34** while, as mentioned hereinabove, being secured thereto. At the bottom of the closure **34**, the cable **36** extends through the Teflon™ block **38** which is mounted to the lower end of the closure **34**. The cable **36** then engages the lower pulley **42** rotatably mounted at the lower end of the guide rail **22**. Afterwards, the cable **36** extends upwards, behind the closure **34** and is then secured to the outer pulley **48**. Between the lower pulley **42** and the outer pulley **48**, at least part of the cable **36** includes an elastic section **54** which acts as a binder for reasons which will be explained hereinafter.

A retaining arm **56** is mounted slightly above the guide pulley **44** for ensuring the engagement of the cable **36** with the guide pulley **44**, as best seen in FIG. **4**.

As seen in FIGS. **1** and **2**, the lower end of the closure **34** comprises a pair of horizontal elastic members **58** which ensure that the closure **34** remains relatively taut at the point of entry thereof in the guide rails **22** when the closure **34** is displaced upwards and gradually becomes "too big" in view of the converging side guide rails **22**. Indeed, as the closure **34** gradually moves upwards, the elastic members **58** pick up the slack produced in the closure **34**. The teflon™ blocks **38** are located opposite the elastic members **58** in order to ensure that, even with the elastic force applied inwardly by the elastic members **58**, the closure **34** and the cables **36** connected thereto can slide along the guide rails **22**.

As seen in FIGS. **11** and **12**, a variant **38***a* of the teflon™ block **38** defines an inner lower recess **60** which communicates with a vertical opening **61** for allowing the cable **36** to leave the closure **34** higher than a lower edge **52** thereof. This configuration allows for the lower pulleys **42** to be mounted above the ground surface (as seen in FIG. **13**) thereby reducing the possibility that they become jammed because of ice built-ups on or near the ground. Opposite the recess **60**, the closure **34** is thus not directly driven by the cable **36**, but the rigidity of the block **38***a* ensures that the lower end **52** of the closure **34** located opposite the recesses **60** of the teflon™ blocks **38***a* extends firmly downwardly right up to the ground so that the closure **34** properly closes the door opening of the shelter S along the whole height thereof and, more particularly, at the lower end **52** of the closure **34** as it is not driven by the cables **36**. Therefore, the

configuration of the teflon™ blocks 38a allow for the lower pulleys 42 to be mounted considerably above the ground to prevent the same from jamming due to ice built-ups, while ensuring that the closure 34 extends vertically and firmly downwards right up to the ground.

As seen in FIGS. 5 and 6, the guide rails 22 are provided with seals 62 inwardly of the slots 40 thereof.

As seen in FIGS. 8 and 10, the overhead shaft 32 does not extend through the double pulleys 46, but rather includes an extension 64 of small diameter which extends outwardly therefrom and through the double pulley 46. The shaft extension 64 then extends outwardly through bearings 66 secured to the support plate 18 and, outwardly of the support plate 18, the shaft extension 64 is fixedly received in a square-toothed gear 68 (e.g. a timing gear), the teeth of the toothed belt 30 being engaged between the teeth of the timing gear 68 for drivingly connecting the motor 26 and reducer gearbox 28 to this timing gear 68.

With reference to FIGS. 3, 4 and 8, it is understood that, when the closure 34 is closed, an appropriate rotation of the motor 26 causes a rotation of the shaft 32 along arrow 70 of FIG. 3 thereby causing the cables 36 to displace along arrow 72 of FIG. 4, whereby the cables 36 gradually wind around the inner pulleys 50 while the closure 34 is being raised along the guide rails 22 along arrow 74 of FIG. 3 and arrow 76 of FIG. 13, the lateral edges of the closure 34 which enclose the cables 36 gradually winding around the inner pulleys 50 (see FIG. 10) while the cables 36 simultaneously unwind from the outer pulleys 48 along arrow 78 of FIG. 4. As the closure 34 is being raised, the effective width thereof increases but, in view of the tapered configuration of the inner pulleys 50 (again see FIG. 10), the closure 34 will wind around the shaft 32 while remaining substantially taut in view of the outward stacking of the cables 36 onto the inner pulleys 50. The outer pulleys 48 are slightly angled to facilitate the unwinding and winding of the cables 36 therearound in view of the angular orientation of the cables 36 below the outer pulleys 48, as seen in FIG. 8. Furthermore, the tapered configuration of the inner pulleys 50 ensures that the closure 34 winds there around in an orderly fashion, as seen in FIG. 10. As seen in FIG. 3, the cable 36 is directed by the guide pulley 44 towards the larger outward end of the tapering inner pulley 50 so that the cable 36 can then appropriately slide downwards and inwards from this outward end of the inner pulley 50 towards the inward smaller end thereof, thereby ensuring a neat and orderly stacking of the coils of the cable 36 around the inner pulley 50.

The elastic portion 54 of each cable 36 acts as a binder to ensure that the cables 36 remain taut during the operation of the closure 34 in view of the fact that, during rotation of the double pulleys 46, the amount of cable which is being wound around one of the outer and inner pulleys 48 and 50 thereof is normally different from the amount of cable which unreels from the other one of the outer and inner pulleys 48 and 50, respectively.

Even though there are elastic portions 54 in the mechanism for driving the closure 34 between the open and closed positions thereof, the motor 26 acts directly on the closure 34 during the ascension thereof, i.e. its displacement towards its open position, as it is the unextendable cables 36 which act on the closure 34, the binder mechanism provided by the elastic portions 54 being only functional during the lowering of the closure 34. This configuration allows the motor 26 to exert direct forces on the closure when it is being opened thereby enabling the motor 26 to dislodge the lower

end of the closure 34, for instance, from ice having built up thereat while the closure 34 was closed.

Alternatively, the elastic portions 54 can be replaced by springs 84, as seen in FIG. 11, which might have a more constant spring force for the various operating temperatures of the closure device D.

The elastic members 58 again will ensure that the slack gradually provided in the closure 34 when it is raised is taken up substantially centrally of the closure 34 and not at the lateral edges thereof in order to ensure a proper sliding action of the closure 34 along the guide rails 22, that is to prevent a jamming of the lateral edges of the closure 34 in the slots 40 of the guide rails 22.

A reverse operation of the motor 26 causes the cables 36 to wind around the outer pulleys 48 of the double pulleys 46, whereby the closure 34 is pulled downwards along the guide rails 22 and thus unwinds gradually from the inner tapered pulleys 50 of the double pulleys 46.

As well known in the art of garage doors, a remote control can be provided for remotely operating the motor 26 thereby allowing the user to open and close the closer 34 at a distance and, for instance, from within a vehicle.

When the closure 34 is closed, the elastic members 58 can still be somewhat extended in order to allow for the closure 34 to sufficiently yield when a force is applied thereon, such as by snow being thrown thereon by a snowplow or the like, thereby preventing rupture of the closure 34.

As seen in FIG. 8, the ends of the cables 36 are secured to the outer pulleys 48 by screws 80 and to the inner pulleys 50 by screws 82.

For manual opening and closing of the closure 34 in case of a failure of the motor 26 or in case of the closure 34 becoming jammed in the guide rails 22 due to ice, there are provided a pair of side zippers 86 (see FIGS. 1 and 2) which extend parallel to and slightly inwards of the guide rails 22, whereby the closure can be manually rolled and then attached at the top of the door opening with strings 88.

Accordingly, by way of the closure device D of the present invention, a flared door opening defined in a vehicle shelter C can be completely closed in a substantially taut way and, when the closure is being raised or generally when it is at least partly wound around the overhead shaft, the closure is wound in an orderly and taut fashion around this overhead shaft. The closure device of the present invention thus allows for a motorized closure to be installed on a vehicle shelter without reducing the effective width of the door opening thereof.